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File No. 994 3c III (~~1~~)

I **B CLASS** V.R. **DEPARTMENT**

C.E. **BRANCH** V/S 3c B(III)

Subject:— Examinations — Professional.

BK

File No. 994 3c III (~~1~~)

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G.P.K.—J.H.3-50,000-5.54
G.R.G.D No. 2108, dated 22-6-22.]

Correspondence

Sectt 78 A 8

DOCKET SHEET (B)

File No. 994/36 III

Subject:— Examinations — Professionals.

P. W. DEPT.

E - BRANCH. (I)

References:—

Date.	To whom sent.	Notes instructions,

Questions set at the Professional Examinations of Asstt. Deputy Engineers and Supervisors held in 1947 (Electrical Circle)

(For Official use only)

BOMBAY
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1950.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS CLASS I.

General Engineering connected with Irrigation, Roads and Buildings (Written).

JUNE 1947.

Date : 30th June 1947.

[TIME—12 NOON TO 2 P.M.]

All questions carry equal marks. Attempt any six questions.
Total Marks 75.

(1) Give specifications for—

Roofing of double country tiles.
Roofing of Mangalore tiles.
R. C. C. flooring.
Asbestos sheet roofing.
Cast-in-situ arching of cement concrete for 30′ span × 20′ high openings of a road bridge.

(2) Describe how you would ascertain waterway necessary—

(*a*) for a road culvert.
(*b*) for a canal culvert.
(*c*) how much catchment area can a hume pipe drain of 2′ diameter satisfactorily drain off ?

(3) (*a*) What thickness of walls will you adopt for a three storeyed hostel building each storey 12′ high ?

(*b*) Give a reasonable daily outturn per artisan or labourer for laying brick masonry.
Dressing 8″ khandkies.
Cement pointing Shahabad stone floor.
Excavation in soft murum.
Chiselling hard rock.

(4) Describe all the principal building materials available in your District for small bridges and for large storeyed buildings.

(5) Give dimensioned sketch—

(A) of parapet and drawing water arrangement with a wind-lass for an 8′ diameter well.
(B) two-seated urinal for an office.

(6) How do you organise labour and material and supervision to rebuild urgently a fallen jail compound wall 100′ long.

(7) Give rough dimensioned sketch of an Executive Engineer's Office to accommodate—

One room for the Executive Engineer.

One room for Accounts Branch to accommodate two Accountants, 1 Storekeeper and 8 clerks.

One room for Drawing Branch consisting of 6 men.

One room for Correspondence Branch for 6 men.

SOUTHERN CIRCLE.

Irrigation and the Irrigation Act.

DATE : 30TH JUNE 1947.

[TIME—3 P.M. TO 5 P.M.]

All questions carry equal marks.

Question 1—What is cusec day and what irrigation do you expect from it for various crops on your canal. Give a sample programme.

Question 2—A canal is blocked unauthorisedly by a Company putting a bund across the canal. What action do you take ?

Question 3—What are the duties of the canal Inspector ?

Question 4—What is meant by Rights and Obligations of an Irrigator ? Quote them and say what they mean.

Question 5—In how many ways do you measure canal discharges and which do you prefer. Why ?

Question 6—Give an economical design for an aqueduct 100′ long to carry 500 cusecs with a motorable road

SOUTHERN CIRCLE.

Roads and Buildings (Written).

30TH JUNE 1947.

[TIME—3 P. M. TO 5 P.M.]

Note : Illustrate your answers with neat sketches.

Marks

1. A cement concrete surface 18′ wide is to be provided over a road having 15′ water bound macadam and 24′ wide formation with heavy traffic. Trial pits taken in the road show in one length 8″ of metal crust and hard murum below and in another length the crust of metal is 4″ over average murum. Give a dimensioned cross section of the road showing crust and the type of treatment of the sub-grade considered necessary, if any. Give specifications for a single course bonded cement concrete proposed to be provided including sub-grade treatment if any. 15

Marks.

2. What are the causes of cracks in concrete road slabs and how will you try to minimize them? What arrangements do you adopt round cast iron sewerage man-holes in a concrete road and why? 12

3. What types of asphalt road-construction do you know and under what conditions would you use each? 12

4. A river 800′ wide with banks 35′ above bed and in stable regime is to be bridged. Test bores show 20′ of sand, 5′ of clay with Kankar nodules, 4′ of conglomerate and rock below. H. F. L. is 28′ above bed. Give a rough design for the bridge. Describe the type of foundations you would adopt, and give reasons. On what considerations would you fix the size and number of spans. 14

5. How would you try to prevent and minimise corrugations in a water bound macadam surface. 12

6. Give a dimensioned sketch of a 30′ span Queen Post Truss for Mangalore tiled roof. Name the numbers and say which of them are in tension and which in compression. Sketch a prospective view of the joint of the principal with the tie beam. 10

Accounts and Rules of the Public Works Department (Written).

1st JULY 1947.

[TIME: 12 NOON TO 2 P. M.]

1. (*a*) In what different ways and for what different purposes does a disbursing Officer of the P. W. D. obtain funds from Treasury. 13
   (*b*) How are cash receipts from other sources dealt with and accounted for by (*i*) drawing Officer and (*ii*) imprest holder.
   (*c*) State and describe briefly the principal accounts records of a Sub-Divisional Officer.

2. (*a*) What is stock? 12
   (*b*) How is issue rate for stock to be fixed.
   (*c*) In what circumstances can materials be issued to contractors when issue of those materials is not stipulated in the contract and at what rate is that material to be issued.

3. A landslide occurs on a ghat road stopping all traffic. What procedure would you adopt to clear the road from an administrative and accounts point of view. 13

Marks.

4. What are the powers of the Superintending Engineers and Executive Engineers— 12
   (*i*) to sanction estimates for original works and repairs for—
      (*a*) roads and buildings.
      (*b*) Irrigation.
      (*c*) Public Health Works.
   (*ii*) to sanction revised estimates.
   (*iii*) to accept tenders.
   (*iv*) to sanction increase in tendered rates.
   (*v*) to sanction extra items.
   (*vi*) to sanction excess over estimates.

5. What are the following and when do you prepare them :— 12
   (*i*) Revised estimate.
   (*ii*) Supplementary estimate.
   (*iii*) Reduced estimate.
   (*iv*) Completion Report.
   (*v*) Completion Certificate.
   (*vi*) Workslip.

6. What are the authorised forms of bills in the P. W. D. and when do you use each ? 13

General Engineering (Oral).

DATED 1ST JULY 1947—3 P.M.

75 Marks.

1. How do you test bricks for building purposes ?
   What is hydraulic line ?
   What is fat line ?

2. How do you measure for payment the following :—
   Rubble.
   Road Metal.
   White washing of wall having doors and windows.
   Masonry of walls with doors and windows.

3. What are the usual proportions of cement concrete for—
   Piles.
   Piles for arches.
   Piles for foundations.
   Lime and sand for plaster.

4. What roof will you propose for—
   A small kerosene oil shed.
   Tall Factory Shed.
   Temporary Barracks.

5. What is the weight of—
   Galvanized corrugated iron sheets.
   ¼" steel chequered plate.
   Trafford absestos sheets.
   Ashpalt drum full.
   Asphalt drum empty.
   Hume pipe 6'×6".
   Mangalore tiles and batten roof.

6. What load will a P. W. D. lorry usually carry ?
   Give reasonable lorry load for—
   Cement bags.
   Burnt bricks.
   Sand.
   Rubble.
   Full asphalt drums.

7. Give sizes of—
   Motor garage.
   Ordinary latrine.
   Rise and tread of a Maternity Hospital staircase.
   Width of a modern office verandah.
   Width of a servant's quarters gallery.

8. How do you quickly ascertain radius of a curve on an existing old road.
   How do you examine trenches of a foundation before filling in.

9. How do you classify excavation for payment in :—
   Hard Rock blasted.
   Soft rock.
   Hard murum and boulders.
   Earth or Sand.
   Does use of explosives constitute a definite reason for higher classification ?
   Do you know the safety precautions to be adopted in use of explosives ?

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS (I).

Roads and Buildings (Oral).

1st JULY 1947.

[TIME—4 P.M.]

Marks.

1. What measures would you adopt to have effective water proofing of a Reinforced Cement Concrete roof slab ? 8

2. How would you try to prevent cracks in small school building to be built in deep black soil ? 8

Marks

3. What is traffic census ? How is it taken and why ? 6

4. What quantities of different materials do you use for getting 100 Cft. of 1: 2 : 4 cement concrete ? 8

What bulkage do you allow ?

5. What items have you to check up before allowing cement concrete to be poured in a Reinforced Cement Concrete floor slab ? 8

6. What items would you attend to on a ghat road before and during the monsoon, in a tract of heavy rainfall ? 8

7. What is the latest classification of roads ? Name one road under each class in your Division. 6

8. What is the usual width of metal on the majority of roads in your Division ? What is the gauge of metal usually used ? What thickness of metal is used normally in your Division for resurfacing from C. R. grant ? 8

9. What are safe permissible loads on— 6
   1 blacksoil.
   2 murum.
   3 C. R. masonry of granite stone in lime.

10. What is the camber you would allow for—
   (*a*) water bound macadam road.
   (*b*) asphalt road.
   (*c*) cement concrete road.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS (I).

Irrigation (Oral).

1st JULY 1947.

Marks

[TIME—4 P.M.]

1. What is— 10
   (*a*) Adsali.
   (*b*) Nidwa
   (*c*) Module
   (*e*) Hydro-iso-bath
   (*e*) Regenerated flow.

Marks.

2. (*a*) What data do you collect for sub-soil survey ? 10

(*b*) Why is it necessary ?

(*c*) What is the prime need for the success of a drainage channel in a water logged area ?

3. When do you hold a panchnama ? 8
What is the procedure for preparation and disposal of a panchnama ?

4. What are the obligations of irrigators under IInd Class Irrigation Works regarding maintenance of these works ? 8

5. What are the rules for irrigation from a well which is 75' from a canal ? 8

6. What is the procedure for recovering irrigation assessment from the initial water application of the irrigator to the actual recovery ? 8

7. How would you gauge a river ? 8

8. What is the usual time for planting (*i*) Suru and (*ii*) Adsali cane ? 8

How much area is irrigated by a well ?

9. What are the inch depths allowed for Factory cane in 7
(*a*) Hot Weather
(*b*) Kharif
(*c*) Rabi.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS (I)

SOUTHERN CIRCLE.

Accounts and Rules of the Public Works Department (Oral).

2ND JULY 1947.

[TIME—12 NOON.]

Marks.

1. What are the different forms of tender ? 8
When do you use each ?

2. What are the conditions to be observed before a work is started ? 8

Marks,

3. What are Registers of works ? 9

Why are they required ?

What information is found in them ?

4. What is a Schedule of rates ? 9

How is it maintained ?

What purpose does it serve ?

5. The existing damaged lime concrete floor of a bungalow is to be replaced by a costlier and superior type of tiled floor. How would you classify the work ? 8

6. What is—

(*i*) A Pass Book.

(*ii*) Remittance Transfer Receipt.

(*iii*) Transfer Entry Order.

(*iv*) Advice of transfer debit.

(*v*) Major Work.

(*vi*) Contractor's ledger. 6

7. What is the currency of a cheque ?

What will you do if a payee—

(*a*) loses a cheque,

(*b*) dies suddenly before the cheque is cashed ?

8. What action will you take if a contractor's progress is inadequate ? 9

9. What check has to be exercised on measurements of works by— 6

(*a*) Superintending Engineer.

(*b*) Executive Engineer.

(*c*) Sub-Divisional Officer.

10. Can you use Cash Receipts for expenditure ? 6

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS OF THE B. S. E., CLASS II.

POONA.

JUNE 1947.

Monday, 30th June 1947.

[11 A.M. TO 1 P.M.]

General Engineering.

(Written.)

You should attempt any four questions. All questions carry 18 marks each, and 3 marks are reserved for neatness of sketches.

1. Design an R. C. C. slab and beam floor to carry an *equivalent* dead load of 100 lbs. per square foot, exclusive of weight of floor. The spans between the supporting walls are 12 feet in one direction and 30 feet in the other. Working stresses may be taken as 600 lbs. per square inch for concrete in compression and 16,000 lbs. per square inch for steel in tension. No calculations for shear reinforcement are required.

2. Design an R. C. C. "short" column to carry a weight of 500,000 lbs. The spacing of the columns is 15 feet centre to centre and as the ground will carry a safe load of only 2 tons per square foot, the foundation consists of a continuous beam footing. Design this and sketch details of reinforcement in column and footing and at the junction of the two.

3. Make a sketch of a King Post roof truss of 20 feet span, showing positions of purlins and rafters. The approximate sizes of the members should be shown and large scale sketches made of the details.

4. Sketch in cross section an earthen dam 40 feet high to be constructed on black soil in a locality where muram is available for the casing. Show all main dimensions and the probable actual hydraulic gradient and explain the functions of the various parts.

5. Design in section a waste weir wall 10 feet high with 2 feet top width founded on rock. The maximum depth of overflow is 3 feet (upstream depth above crest level).

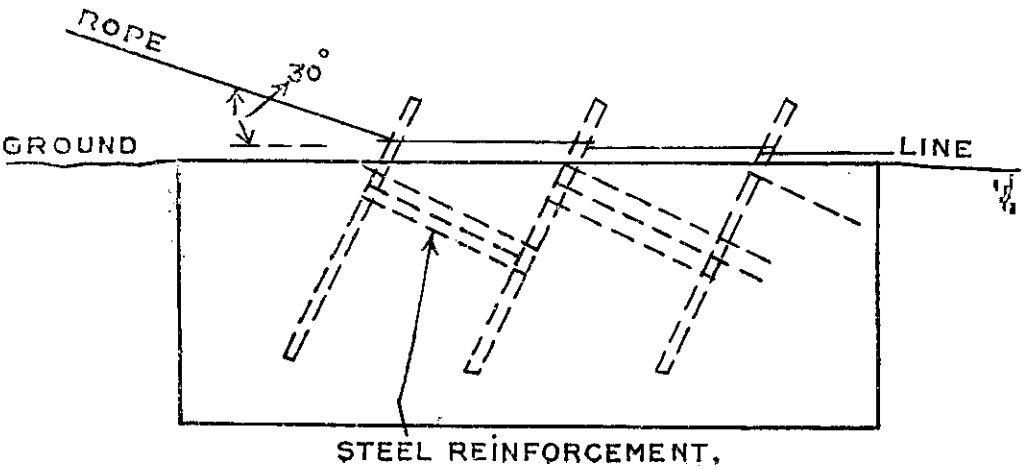
   Downstream pressure may be ignored.

6. Design a canal distributary for a discharge of 10 cusecs and longitudinal slope 1 in 1,000 in the Deccan and give a sketch with principal dimensions of its cross-section in half bank.

7. Sketch a slab drain over a canal distributary or a road culvert and prepare measurement sheet and estimate for its construction.

8. Sketch a typical village well of the design followed in your Division and explain the meaning of "cone of depression". What means of construction would you adopt (*a*) in sand, (*b*) in fine silt, (*c*) in black soil over muram and rock?

9. The illustration (below) shows an anchor block for a ferry rope. The maximum pull on the rope is 20 tons including a safety margin. Calculate a suitable size of block and size and length of rolled steel joints required (tables of R. S. J. sections may be used).



PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS OF THE B. S. E., CLASS II.

POONA.

JUNE 1947.

Monday, 30th June 1947.

[2-30 P.M. TO 4-30 P.M.]

Accounts and Rules of the P. W. D.

(*Written.*)

Any four questions may be attempted in addition to question No. 1 which is compulsory. All questions carry 15 marks each.

1. Post in cash book form the following transactions :—

Date.		
21st June 1947	...	Opening balance Rs. 200 as imprest with Overseer "A": *plus* Rs. 25 cash balance which includes four numbers one anna Revenue stamps.
22nd June 1947	...	Drew a cheque for Rs. 800 to replenish chest—cheque No. 7777/25.
24th June 1947	...	Paid difference of dearness allowance to work-charged Establishment Rs. 125 (part-payment).
26th June 1947	...	Paid 2nd R. A. Bill for Rs. 700 by cheque No. 7777/26 and recovered *per contra* Rs. 35 for Security Deposit—to Mr. M. H. Rahimtoola for supplying road metal.
29th June 1947	...	Recouped imprest of Overseer "A" by cheque No. 7777/27 for Rs. 190.
5th July 1947	...	Received an amount of Rs. 500 in cash for sale of Babool pods from Mr. Nargolwale—H. D.
6th July 1947	...	Paid cash receipts into Treasury—Rs. 500.
8th July 1947	...	Paid difference of dearness allowance to work-charged Establishment Rs. 75 (part-payment)—See item (3) above.

2. (*a*) What are the " contract documents " ?

   (*b*) What fundamental points would you verify before putting out of a work to tender ?

   (*c*) What precautions would you take in opening tenders publicly, to render them secure against tampering ?

3. What are the powers of a Deputy Engineer in respect of—

   (*a*) Acceptance of Tenders ?

   (*b*) Rate Lists ?

   (*c*) Payment of First and Final Bills ?

   (*d*) Running Account Bills ?

   (*e*) Advance Payments ?

4. What are the Accounts Returns required to be submitted by the Sub-Divisional Officer to the Executive Engineer—

   (*a*) Monthly,

   (*b*) Half-yearly,

   (*c*) Yearly ?

5. What are the authorised forms of bills and vouchers and in what cases are they used ?

6. (*a*) Explain " Revised Estimate ", " Supplementary Estimate " ; what documents are to accompany each ?

   (*b*) When is a reduced Estimate necessary ?

7. Distinguish between :—

   (*a*) " Earnest Money " and " Security Depost ".

   (*b*) " Sub-work " and " Sub-Head ".

   (*c*) " Market Rate " and " Issue Rate ".

   (*d*) " Major Work " and " Minor Work ".

8. What steps are to be taken when :—

   (*a*) A refund of a deposit is made to a contractor ?

   (*b*) The currency of a cheque expires ?

   (*c*) The final bill of a contractor shows that he has been over-paid ?

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS OF THE B. S. E., CLASS II.

POONA.

JUNE 1947.

Tuesday, 1st July 1947.

[11 A.M. TO 1 P.M.]

Roads and Buildings.

(Written).

Any five questions may be attempted. All questions carry 15 marks each.

1. (*a*) What percentage of the repair allotment on a road would you allocate roughly for—
   (*i*) Arboriculture ?
   (*ii*) Reserve metal collection ?
   (*iii*) Resurfacing ?
   (*iv*) Maintenance ?

   (*b*) For the best and most economic results why and in what months of the year will you resurface a mile of road and why—
   (*i*) passing through deep black soil ;
   (*ii*) passing through the ghats with 100″ to 150″ rainfall in the monsoon ?

   (*c*) What points will you look to when you inspect a road being resurfaced with a steam roller ?

2. Prepare a type estimate for resurfacing a mile of water bound macadam road, 3″ metal resurfacing 15 feet wide, side widths, 3 feet wide on each side. Assume rates which are at present current in your Sub-Division with the following leads, metal 3 miles, hard muram—1 mile, soft muram—one furlong. Provide for consolidation by steam roller.

3. A P. W. R. Road Estimate provides four items, viz. :—

	Unit.
(*a*) Resurfacing in 3″ W. B. M. ...	100 sq.ft.
(*b*) Consolidation of above ...	per mile.
(*c*) Raising side berms ...	100 sq.ft.
(*d*) Consolidation of above ...	per mile.

   What are the advantages and disadvantages in preparing tender schedules as in the above estimate ? If there are disadvantages, how would you modify and prepare schedules of items for the tender ?

4. Draw up brief specifications for—

Laying a semi-grout or bitumen chipped macadam surface 2″ thick—using 20 cuft of metal per 100 sq. ft. sealed with 8 cuft premix on top, on a base of water bound macadam,

or

Laying a 1½″ premix carpet using 15 cuft aggregate per 100 sq.ft., sealed with 5 cuft chips rolled dry and with a liquid seal coat on top.

5. In a C. C. 6″ road slab (1 : 2 : 4), state what grades of metal you would use and how you would proportion them ? What is " Fineness Modulus " ?

How much slump will you allow in a mixture for a road slab ? How many gallons of water will you use in a batch mixer using a bag of cement (112 lbs.) per batch, (*i*) on a winter day and (*ii*) during the midday hours in summer ?

What is the function of dowel bars ?

6. Write out a rate analysis for a 100 sq.ft. of C. C. road slab 6″ thick (1 : 2 : 4) of standard P. W. D. specifications :—

Cement ... Rs. 80 per ton on road side.

Metal ... 3 miles lead.

Sand ... 5 miles lead.

Water ... 2 miles lead.

Exclude the cost of the dowel bars, and the road paper.

7. (*a*) What are the qualities of Mangalore tiles " A " quality ?

(*b*) How will you lay a roof of C. A. Sheets (Trafford) ?

Explain briefly with sketches.

(*c*) In a very windy locality what steps will you take during construction for securing the roof of (*a*) above and (*b*) above from being easily blown away ?

Write briefly, with sketches.

8. While inspecting a building how would you make a quick field test of the proportions of (*a*) lime mortar, (*b*) cement mortar, being used on the work in order to satisfy yourself that the mortars are as required in the specifications ?

What are the qualities of a good brick ?

What points do you look to when you inspect brick work in progress ? How much mortar have you seen being used per 100 cubic feet of brick work ?

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS OF THE B.S. E., CLASS II.

POONA.

JULY 1947.

Tuesday 1st July 1947.

[11 A.M. TO 1 P.M.]

Irrigation and the Irrigation Act.

(Written.)

Six questions may be attempted of which Nos. 1, 2 and 3 are compulsory. Questions Nos. 1, 2 and 3 carry 10 marks each and all the others 15 marks each.

1. (*a*) What are the objects of the block system ?
   (*b*) What sizes of bunds are required for (*i*) seasonal crops ? (*ii*) sugarcane ?
   (*c*) What action may be taken if the bund rules are not complied with ?

2. (*a*) A crop is irrigated by well water which is taken through a water course, also used for canal water ; is the crop liable for water rate (*i*) under any circumstances ? or (*ii*) only if it can be shown that canal water was taken ?
   (*b*) What is the maximum rate which can be charged for unauthorised irrigation ?
   (*c*) Under what circumstances is remission of water rate given, and by whom ?

3. A crop is irrigated from a well (*a*) 50 feet (*b*) 200 feet from a canal. What rates are chargeable, if any, if the well is considered to benefit by (A) percolation from the canal ? or (B) a piped supply from the canal ? How would you determine whether the well benefited by percolation from the canal ?

4. Sketch a cross section of a typical valley in the irrigated tract of the Deccan, showing soil and sub-soil strata and the formation level of a main drain and longitudinal section of a branch pipe drain. Also sketch a cross section of the pipe drain, showing the sub-soil water level before and after construction.

5. What are the advantages of volumetric supply of canal water? What are the possible means of abuse? and what precautions are taken? Make a sketch showing the arrangements for the measurement of supply.

6. Design a Standing Wave Flume for construction at the head of a distributary carrying a maximum discharge of 6 cusecs. Make a sketch showing the main dimensions and explain the features of the design.

   What is the safe maximum recovery of head for modular action?

   How would you know whether a S. W. F. is working with modular action?

7. Draw up a typical irrigation programme for a major canal, covering the rabi and hot-weather seasons only. The storage at the beginning of the rabi is 10,000 million Cubic Feet, the area of local irrigators 1 : 3 blocks is 15,000 acres and factory cane is 4,000 acres (basic). 30 per cent. overlap is allowed in the rabi only in each case. All surplus water is to be used on rabi food crops. Canal losses may be taken as 25 per cent. of the discharge at the head of the canal on a seasonal basis, and evaporation and river gains, combined, as plus 200 M. Cft. in the rabi and minus 100 M. Cft. in the hot weather. (Note : 1cusec per acre= 1 inch per hour : 1 cusec flowing for 1 month=2·6 M. Cft.

8. Describe the duties of :—

   (*a*) a block measurer, (*b*) a canal inspector, (*c*) a patkari, (*d*) a daftar karkun. Describe briefly the process of measurement and assessment of crops.

[2–30 P.M. TO 4–30 P. M.]

General Engineering.

(Oral.)

(Six questions carrying 10 marks each. 15 marks to be awarded for general impression (particularly quickness of understanding and reply.)

1. Define the following : (*a*) Catchwater drain, (*b*) revetment, (*c*) hydraulic gradient, (*d*) ruling gradient, (*e*) offset, (*f*) blindage, (*g*) super-elevation, (*h*) template, (*i*) cut and fill, (*j*) road dam, (*k*) flood absorption, (*l*) needle valve.

2. Describe the main types of surface soil and sub-soil strata found in the Deccan State—what tests you would apply to identify them. Which sub-strata would you expect to find below each type of surface soil? Which types are suitable for the foundations of masonry works and which are unsuitable? Why are buildings constructed on black soil liable to crack and what measures are possible to prevent this?

3. What types of material are used in the Deccan for the construction of earthern dams, and why? How would you determine whether a material is suitable for (*a*) casing, (*b*) hearting, (*c*) puddle trench. What means are used to consolidate the material and under what circumstances is watering required? What are the important points to see during an inspection of an earthern dam under construction?

4. What qualities and defects would you look for when inspecting (*a*) rubble for masonry, (*b*) sand for cement plaster, (*c*) bricks, (*d*) country tiles, (*e*) teakwood for purlins, (*f*) teakwood for furniture, (*g*) distemper, (*h*) paint.

5. What requirements should be carefully observed in the selection of materials for and mixing of cement concrete for reinforced concrete. If no suitable sand is available locally, what substitute would you consider for (*a*) reinforced concrete, (*b*) cement mortar or brick masonry.

6. The foundations of a cross drainage work are excavaged in the sandy bed of a nalla and water enters the excavated trenches faster than it can be pumped out. What methods of construction can be adopted.

7. What is a cross-drainage work? How is the area of waterway calculated? What precautions have to be taken in a work founded on sand or a silty soil: (*a*) to prevent damage by scour downstream, (*b*) to prevent "piping", (*c*) to reduce uplift.

8. What are the following: (*i*) velocity head, (*ii*) critical velocity, (*iii*) energy of flow, (*iv*) modular flow, (*v*) standing wave, (*vi*) standing wave flame, (*vii*) Venturi flame. Explain how a hydram works.

9. What are the rates of wages in your district for (*a*) coolies, (*b*) carpenters, (*c*) masons. What are the schedule rates for (*d*) C. R. masonry, II sort, (*e*) 1 : 2 : 4 cement concrete, (*f*) excavation in soil, (*g*) excavation is soft murum, (*h*) excavation in hard rock by blasting? Why is it

desirable to provide separate items in a tender for concrete, steel and formwork, instead of having a comprehensive item of reinforced concrete in cubic feet ?

Wednesday, 2nd July 1947.

[7-30 A.M. TO 10 A.M.].

Practical Test.

All questions carry 15 marks each and 15 marks are reserved for quickness, etc.

1. Explain handling the given level, the permanent adjustments and how you will carry them out.

2. Set up a Theodolite and read the horizontal angle between two specified points.

3. Set out a 200 feet Radius curve by chord and offset method.

4. Take fly levels touching five given points and give closing error.

[11 A.M. TO 1 P.M.]

Accounts and Rules of the P. W. D.

(*Oral.*)

(Eight questions carrying 8 marks each *plus* 11 marks for general impression and quickness etc.).

1. When is a revised Administrative approval necessary?

2. What are the main points to be considered before paying a secured advance to a contractor on materials collected at site of works ?

3. What per cent. check measurements are necessary and by whom in the following cases :
   (*a*) measurements recorded by an Overseer for work done on a Muster Roll ?
   (*b*) measurements recorded by an Overseer for work done on a Muster Roll ?
   Overseer for supply of materials on requisition costing Rs. 300 ?
   (*c*) Final measurements of a original work costing Rs. 180 ?
   (*d*) current measurements on a work costing Rs. 1,500 done on B-1 tender ?

4. Enumerate the classes into which P. W. D. Stores are divided ?

5. What per cent. deductions due to voids are applied while recording the measurements for the supply of—
   (*a*) metal 1½" to 2" size ?
   (*b*) Soft murum ?
   (*c*) Sand ?
   (*d*) Hard murum ?

6. How would you classify the works given below :—
   (*a*) Raising canal banks for giving the canal an increased discharging capacity ?
   (*b*) Widening the bank of a canal from 10' to 12' to make the Inspection path safer ?
   (*c*) Giving a seal coat on an existing 2½" asphalt premix carpet ?
   (*d*) Replacing a country tiled roof of a Building by a mangalore tile roof with a new ceiling ?

7. What action will you take when—
   (*a*) Surplus cash is found in the chest ?
   (*b*) Deficit cash is found in the chest ?

8. What is the essential difference between—
   (*a*) Piece work Tender (A-1, A-2 forms) and Puccan Tenders (B-1, B-2 forms).
   (*b*) Conveyance allowance and P. T. A. ?

9. Whose sanction is necessary to—
   (*a*) demolish a building costing Rs. 300 found unsafe ?
   (*b*) Make payments on a muster roll lost before it is passed for payment ?

10. When fixing rates for Extra Items with a contractor, what are the main considerations regarding the maxima that you would normally allow having regard to the relevant current Government orders ?

Wednesday, 2nd July 1947.

[2–30 P.M. TO 4–30 P.M.]

Irrigation and the Irrigation Act.

(Oral.)

(Five questions carrying 14 marks each and 5 marks reserved for general impression, etc.)

1. What does the term "canal" comprise, as defined by the Act ? Under what conditions can a river be treated as a "canal" under the Act ?

2. Water is taken unauthorisedly by a tenant cultivating a piece of land, but due to the negligence of the canal staff, no panchanama is served before the tenant leaves the locality and cannot be traced. Who should be held liable to pay the charges for the unauthorised irrigation : (*a*) the land-owner, (*b*) the canal staff who were negligent, (*c*) no one ?

3. What are (*a*) garden block, (*b*) two-seasonal block, (*c*) sugar-cane block, (*d*) perennial crop, (*e*) overlap, (*f*) adsali cane, (*g*) bhadepatrak, (*h*) record of rights?

4. What are the relative drainage qualities of the following : (*a*) chopan, (*b*) sand, (*c*) man, (*d*) soft murum, (*e*) hard murum, (*f*) rock. Drains in the irrigated tract are usually constructed 7 feet to 8 feet deep ; why is this ? What are the relative advantages of pipe drains and open trenches ?

5. In which seasons do the following crops require irrigation and at what intervals :. (*a*) sugarcane, (*b*) rice, (*c*) wheat, (*d*) jowar, (*e*) bajri, (*f*) lucern grass, (*g*) fruit trees, (*h*) onions.

Why is it undesirable to allow rice in cane blocks ?

Wednesday, 2nd July 1947.

[2-30 P.M. TO 4-30 P.M.]

Roads and Buildings.

(*Oral.*)

[Six questions (including Nos. 6 and 7) each carrying 12 marks and three marks reserved for general impression, etc.]

1. Can you adopt a railway gang system for road maintenance in the P. W. D. ? Give reasons.

2. What is ribbon development ? Why is it prohibited and where ?

3. On a Ghat road subject to heavy rainfall what items of main tenance will you attend to before the monsoon ?

4. What average cross slope do you allow on (*a*) W. B. macadam surface ? (*b*) asphalted surface ? (*c*) C. C. Road

What are traffic lanes and traffic islands ? What do the latter aim to ensure ?

5. What are the prevailing rates in your sub-divisions for—
   (*a*) B. B. in lime mortar in superstructure cement painted both sides ?
   (*b*) country teak wood wrought and put up ?
   (*c*) C. T. Door Battened and ledged with iron fixtures ?
   (*d*) White washing, 2 coats ?

6. What is a cutback asphalt ? Name any such ready-made one you know—In what specifications is it used ?
   To what temperature will you have to heat a (*a*) cutback ? and (*b*) 80–100 asphalt ?

7. If premoulded expansion joint is not available, how will you fill the expansion joint between road slabs ?
   What records will you keep to verify that adequate cement is being used and that curing is done for the full required period ?
   If bags of cement are torn, how would you allow cement to be measured for a batch mixer (1 bag per mix) ?

CENTRAL

Result of the Professional Examination of Deputy Engineers held in the 30th June 1947 and the

Serial No.	Name of Officer.	General Engineering connected with *(Irrigation), Roads and Buildings and including Building materials and construction, management of labour, knowledge of local resources.			Modern types of Roads Construction.		
		Written.	Oral.	Minimum required.	Written.	Oral.	Minimum required.
		75	75	90	75	75	90
1	Mr. Shridhar Vishnu Lonkar, B.E. (West Khandesh Division).	26	55	81 =54%	48	65	113 =75%
2	Mr. Vinayak Ramachandra Ghangurde, B.E. (Belgaum Division).	52	54	106 =71%	44	55	99 =66%
3	Mr. Ravishankar Janardan Oak, B.E. (Nasik Division).	44	46	90 =60%	38	36	74 =49%
4	Mr. Bhalchandra Shridhar Kapre, B.E. (Satara Division).	42	41	83= =55%	41	45	86 =57%
5	Mr. Dinkar Bapurao Dongre, D.C.E. (Poona East Division).	43	54	97 =65%	45	50	95 =63%
*6	Mr. Vinodraj Mukundrai Dave, B.E. (Nasik Irrigation Division).	36	36	72 =48%	52	60	112 =75%

*Irrigation and the Irrigation Act.

Note.—To qualify the candidate shall obtain not less than 60 per cent. of the maximum For a pass with credit, the candidate must obtain 80 per cent. or more out of the maxi-

CIRCLE.

Office of the Superintending Engineer, Central Circle, Poona, on the two subsequent days.

Accounts and Rules of the P. W. D.			Practical test.		Total marks obtained.	Minimum number of marks required for passing.	Remarks.
Written.	Oral.	Minimum required.	Practical	Minimum required.			
75	75	90	50	30	500	330	
56	59	115 =77%	...	40 =80%	349 =70%	...	Fails. To appear in General Engineering again.
53	60	113 =75%	...	41 =82%	359 =72%	...	Passes.
45	35	80 =53%	...	22 =44%	266 =53%	...	Fails.
55	44	99 =66%	...	41 =82%	309 =62%	...	Fails.
44	56	100 =67%	...	47 =94%	339 =68%	...	Passes.
50	29	79 =53%	...	40 =80%	303 =61%	...	Fails.

marks in each subject and not less than 66 per cent. of the maximum aggregate marks.
mum aggregate number of marks.

(Signed) J. R. PHILLIPS,
Superintending Engineer, Central Circle
(President).

EXAMINATION IN P. W. D. ACCOUNTS FOR UPPER SUBORDINATES.

29th September 1947.

(Written Paper.)

[TIME ALLOWED—3 HOURS.]

Marks.

I. Post the Cash Book of Mr. 'K', Deputy Engineer in charge of 'B' Sub-Division, showing the following transactions, and make closing entries including the certificate of count and the verification of cash balance under your signature as Sub-Divisional Officer.

Date.	Particulars of transactions.	Amount. Rs. a. p.
1st September 1947.	Opening balance ... ... (The balance includes Imprest of Rs. 100 with Mr. "X".)	155 8 0
2nd September 1947.	Drew a cheque for replenishment of cash	300 0 0
3rd September 1947.	Received in cash on account of inspection fees.	75 0 0
5th September 1947.	Given a temporary advance to Mr. 'S' for making payment to labour.	150 0 0
6th September 1947.	Amount sent to Reserve Bank of India, Bombay.	75 0 0
10th September 1947.	Recouped the Imprest of Mr. 'X' in cash.	85 8 0
12th September 1947.	Paid by cheque to contractors, Messrs. Modern Elec. Co. I R/A Bill on account of electric installation at the Civil Secretariat. Rs. 2,500 Less Security deposit 10 per cent. 250	2,250 0 0
13th September 1947.	Received from Mr. 'S' the vouchers and an unspent balance.	45 0 0
15th September 1947.	Payment made to work charged establishment for the month of August 1947.	115 0 0
17th September 1947.	Received by cheque on Imperial Bank of India from Messrs. R. & Co. on account of Inspection fee.	175 0 0
19th September 1947.	Sent the above cheque to the Reserve Bank of India.	40

II. (*a*). What is the basis on which Part II of a Muster Roll is prepared ?

(*b*) Can the measurements be recorded in pencil ? ... 10

III. Point out the difference in the following and state the limits of each with the powers of a Sub-Divisional Officer in respect of the same :—

(1) Rate list. 15

(2) Piece work.

(3) Contract.

Marks

IV. State how Duplicate and Triplicate Receipt Books are used ? 10

V. Write short notes on any five of the following :—

(1) Advance Payment ;
(2) Secured Advance ;
(3) Major Work ;
(4) Revised Estimate ;
(5) Administrative Approval ;
(6) Technical Sanction ;
(7) First and Final Bill.

VI. What steps are to be taken in the following cases :—

(*a*) When a cheque issued to a contractor is reported to have been lost by him. 15

(*b*) When a contractor refuses to accept the payment of a final bill.

(*c*) When the cash in chest is found to be short or surplus.

EXAMINATION IN INDIA ELECTRICITY ACT AND RULES THEREUNDER

(For Supervisors in the Electrical Division).

29th September 1947.

[TIME—2½ HOURS.]

Marks

1. What action is a landlord expected to take prior to constructing a building which will, during and after construction, cause a licensee's mains to be accessible ? 20

2. (*a*) What action may a licensee take if a consumer does not pay his energy bills ? 10

(*b*) In case of dispute regarding the accuracy of the energy meter, how may the matter be settled ? 10

(*c*) If a consumer has provided his own energy meter to record the energy consumed and that the meter has become inaccurate, what is the licensee expected to do ? 10

3. Outline the procedure in the case where a consumer requisitions supply at high pressure from a licensee and up to the time of connection of the high pressure apparatus. 25

4. State whether the services of a licensed electrical contractor are necessary in the following cases :—

(*a*) Where a new electric installation is to be provided. 5

(*b*) Where additions are to be made to an existing electric installation. 5

(*c*) Where it is desired to get an electric installation reconnected to the supply and in which no additions or repairs have been carried out since the electric installation was disconnected. 5

5. Define the following :—

(*a*) Service line. 10

(*b*) Electric Supply Line.

(*c*) Conductor.

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